

## PATENT ABSTRACTS OF JAPAN

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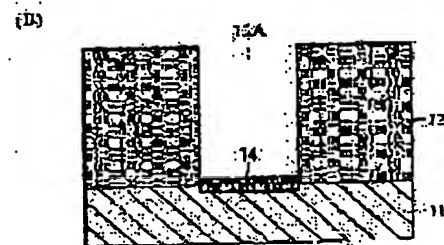
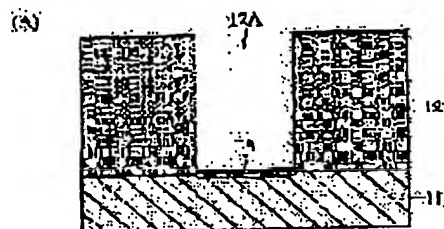
## (54) METHOD OF MANUFACTURING SEMICONDUCTOR DEVICE

## (57) Abstract:

PROBLEM TO BE SOLVED: To suppress increase in roughness of an interface between a TiSix layer and an Si semiconductor substrate, which is caused at formation of the TiSix layer which is formed by reacting a Ti layer to the Si semiconductor substrate in the case where the Ti layer, which is a contact material, is deposited on the Si semiconductor substrate by a CVD method in the method of manufacturing a semiconductor device.

SOLUTION: A method of manufacturing a semiconductor device, which constitutes an electric contact using a Ti<sub>5</sub>Si<sub>3</sub> layer 13 formed by reacting a CVD-Ti layer formed on an Si semiconductor substrate 11 to the substrate 11, is characterized in that when the Ti layer reacts with the substrate 11, carbon, nitrogen, Ta, Nb, Mo and the like, which are an impurity material to suppress the reaction of the Ti layer to the Si semiconductor substrate → C<sub>49</sub>-TiSi<sub>2</sub> reaction, are introduced in the vicinity of the interface between the Ti layer and the substrate 11.

二つの元素は接合をなす界面の断面図

13 : Ti<sub>5</sub>Si<sub>3</sub>  
14 : C<sub>49</sub>-TiSi<sub>2</sub>

## LEGAL STATUS

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JP2001297998

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PN - JP2001297998 A 20011026

PD - 2001-10-26

PR - JP20000110224 20000412

OPD - 2000-04-12

TI - METHOD OF MANUFACTURING SEMICONDUCTOR DEVICE

IN - IKEDA KAZUTO; KAWAMURA KAZUO

PA - FUJITSU LTD

IC - H01L21/28 ; H01L21/285 ; H01L21/3205 ; H01L21/768

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TI - Semiconductor device e.g., semiconductor memory manufacturing method involves introducing carbon near titanium-silicon boundary surface

PR - JP20000110224 20000412

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PA - (FUIT ) FUJITSU LTD

IC - H01L21/28 ; H01L21/285 ; H01L21/3205 ; H01L21/768

AB - JP2001297998 NOVELTY - A titanium silicide layer (13) is formed by reaction between titanium layer and silicon substrate (11). Impurity such as carbon is introduced near the titanium layer and silicon substrate boundary surface for suppressing reaction between titanium silicide layer and silicon substrate.

- USE - For manufacturing semiconductor device e.g. semiconductor memory, by chemical vapor deposition (CVD) process.

- ADVANTAGE - By suppressing the titanium - silicon (Ti-Si) reaction by introducing impurities near boundary surface, the roughness increase in boundary surface between titanium silicide layer and silicon substrate is reduced, thus increasing reliability of contact portion in the device.

- DESCRIPTION OF DRAWING(S) - The figure shows a principal part sectional side view of semiconductor device. (Drawing includes non-English language text).

- Silicon substrate 11

- Titanium silicide layer 13

- (Dwg.2/11)

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AB - PROBLEM TO BE SOLVED: To suppress increase in roughness of an interface between a TiSix layer and an Si semiconductor substrate, which is caused at formation of the TiSix layer which is formed by reacting a Ti layer to the Si semiconductor substrate in the case where the Ti layer, which is a contact material, is deposited on the Si semiconductor substrate by a CVD method in the method of manufacturing a semiconductor device.

JP2001297998

- SOLUTION: A method of manufacturing a semiconductor device, which constitutes an electric contact using a TiSi<sub>3</sub> layer 13 formed by reacting a CVD-Ti layer formed on an Si semiconductor substrate 11 to the substrate 11, is characterized in that when the Ti layer reacts with the substrate 11, carbon, nitrogen, Ta, Nb, Mo and the like, which are an impurity material to suppress the reaction of the Ti layer to the Si semiconductor substrate &arr CVD-Ti<sub>2</sub>S<sub>2</sub> reaction, are introduced in the vicinity of the interface between the Ti layer and the substrate 11.

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